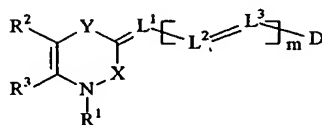
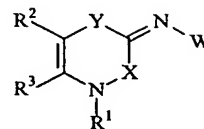


**WHAT IS CLAIMED IS:**

1. A dye represented by Formulae II and IIA below:



**II**



**IIA**

wherein;

R<sup>1</sup> represents a hydrogen, an aryl group containing 6 to 14 carbon atoms, or an alkyl group containing 1 to 12 carbon atoms;

R<sup>2</sup> and R<sup>3</sup> together form an aromatic, carbocyclic or heterocyclic ring system containing 6 to 14 atoms;

X represents a sulfoxide (S=O), sulfone (SO<sub>2</sub>), or dicyanovinyl (C(CN)<sub>2</sub>) group;

Y represents a sulfoxide (S=O), sulfone (SO<sub>2</sub>), carbonyl (C=O) or dicyanovinyl (C(CN)<sub>2</sub>) group;

L<sup>1</sup>, L<sup>2</sup>, and L<sup>3</sup> represent methine groups, wherein the methine groups may combine to form a 5 or 6-membered ring when m is equal to or >1

m is 0, 1, 2, or 3;

W is an aryl group; and

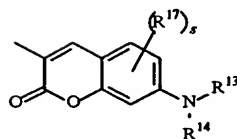
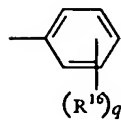
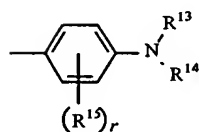
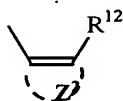
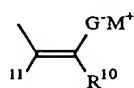
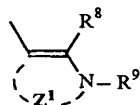
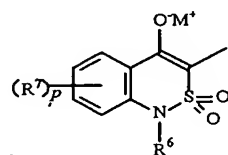
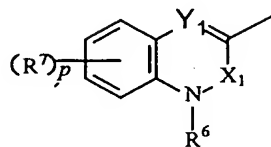
D is a moiety in conjugation with the X and Y groups.

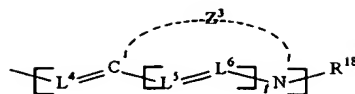
2. The dye of claim 1 wherein R<sup>2</sup> and R<sup>3</sup> together form a benzene ring.

3. The dye of claim 1 wherein X is a sulfone and Y is a carbonyl.

4. The dye of claim 1 wherein D is a group containing a benzene ring or D contains an atom with an available electron pair positioned in conjugation with the X and Y groups, said atom being an O, N, Se, S or C with at least one electron-withdrawing group bonded thereto.

5. The dye of claim 1 wherein D is represented by the following formulae:





wherein

$X_1$  represents a sulfoxide (S=O), sulfone (SO<sub>2</sub>), or dicyanovinyl (C(CN)<sub>2</sub>) group;

$Y_1$  represents a sulfoxide (S=O), sulfone (SO<sub>2</sub>), carbonyl (C=O) or dicyanovinyl (C(CN)<sub>2</sub>) group;

$R^6$  is an aryl group or an alkyl group;

$R^7$  is independently a hydrogen or an alkyl group of 1 to 20 carbon atoms, an alkenyl group of 2 to 20 carbon atoms, an aryl, arylalkyl, heterocyclic or cycloalkyl group of 5 to 14 carbon atoms, or a hydroxy, carboxy, cyano, chloro, or nitro group;

$R^8$  is a hydrogen, or a carboxy, carboxyalkyl, sulfonamido, sulfamoyl, alkyl, arylalkyl, cycloalkyl, alkoxy, alkylamino, or alkylthio group;

$R^9$  is an alkyl group or an arylalkyl or cycloalkyl group;

$R^{10}$  is an alkyl group of 1 to 20 carbon atoms, an alkenyl group of 2 to 20 carbon atoms, or an aryl, aralkyl, heterocyclic or cycloalkyl group of 5 to 14 carbon atoms, and  $R^{11}$  represents an electron withdrawing group, or  $R^{10}$  and  $R^{11}$  may together represent the non-metallic atoms necessary to complete a substituted or unsubstituted ring containing at least one 5- or 6-membered heterocyclic or unsaturated alicyclic nucleus;

$R^{12}$ ,  $R^{15}$ ,  $R^{16}$  and  $R^{17}$  each individually represents a hydrogen, or a carboxy, carboxyalkyl, sulfonamido, sulfamoyl, alkyl, arylalkyl, cycloalkyl, alkoxy, alkylamino, or alkylthio;

$R^{13}$  and  $R^{14}$  independently are an alkyl, alkenyl, aryl, arylalkyl, heterocyclic or cycloalkyl group, or  $R^{13}$  and  $R^{14}$  together represent the non-metallic atoms required to form a substituted or unsubstituted 5- or 6-membered ring with each other, or  $R^{13}$  and  $R^{14}$  individually represent the non-metallic atoms necessary to form a substituted or unsubstituted 5- or 6-membered fused ring with the phenyl ring to which the nitrogen is attached;

$R^{18}$  is an alkyl, arylalkyl or cycloalkyl group;

$Z^1$ ,  $Z^2$  and  $Z^3$  each individually represents the non-metallic atoms necessary to complete a substituted or unsubstituted ring system containing at least one 5- or 6-membered heterocyclic nucleus;

G is  $-O$  or  $-C(CN)_2$ ;

$L^4$ ,  $L^5$ , and  $L^6$  represent methine groups, wherein the methine groups may combine to form a 5- or 6-membered ring when m is equal to or  $>1$ ;

$M^+$  is a cation;

p is 0, 1, 2, 3, or 4;

q is 0, 1, 2, 3, 4, or 5;

r is 0, 1, 2, 3 or 4;

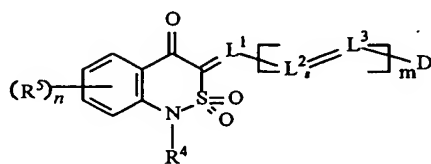
s is 0, 1, 2, or 3; and

t is 0 or 1.

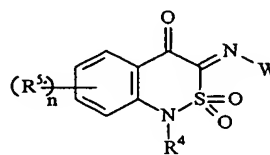
6. The dye of claim 1 wherein the dye is represented by Formula II.

7. The dye of claim 1 wherein the dye is represented by Formula IIA.

8. A dye represented by Formulae III or IIIA below:



III



IIIA

wherein;

$R^4$  represents a hydrogen, an aryl group containing 6 to 14 carbon atoms, or an alkyl group containing 1 to 12 carbon atoms;

$R^5$  is a substituent;

n is 0, 1, 2, 3, or 4;

$L^1$ ,  $L^2$ , and  $L^3$  represent methine groups, wherein the methine groups may combine to form a 5- or 6-membered ring when  $m$  is equal to or  $>1$ ;

$m$  is 0, 1, 2, or 3;

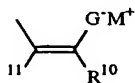
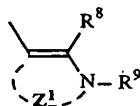
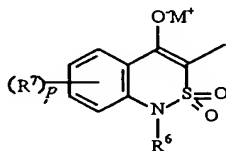
$W$  is an aryl group; and

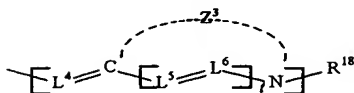
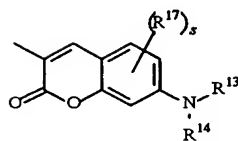
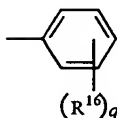
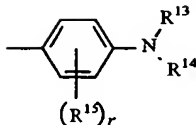
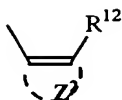
$D$  is a moiety in conjugation with the carbonyl oxygen of the benzothiazine ring.

9. The dye of claim 8 wherein  $R^5$  is independently a hydrogen, or an alkyl group of 1 to 20 carbon atoms, an alkenyl group of 2 to 20 carbon atoms, an aryl, aralkyl, heterocyclic or cycloalkyl group of 5 to 14 carbon atoms, or a hydroxy, alkoxy, carboxy, alkoxycarbonyl, amido, cyano, halogen, or nitro group.

10. The dye of claim 8 wherein  $D$  is a group containing a benzene ring or  $D$  contains an atom with an available electron pair positioned in conjugation with the carbonyl oxygen of the benzothiazine ring, said atom being an O, N, Se, S or C with at least one electron-withdrawing group bonded thereto.

11. The dye of claim 8 wherein  $D$  is represented by the following formulae:





wherein

$R^6$  is an aryl group or an alkyl group;

$R^7$  is independently a hydrogen or an alkyl group of 1 to 20 carbon atoms, an alkenyl group of 2 to 20 carbon atoms, an aryl, arylalkyl, heterocyclic or cycloalkyl group of 5 to 14 carbon atoms, or a hydroxy, carboxy, cyano, chloro, or nitro group;

$R^8$  is a hydrogen, or a carboxy, carboxyalkyl, sulfonamido, sulfamoyl, alkyl, arylalkyl, cycloalkyl, alkoxy, alkylamino, or alkylthio group;

$R^9$  is an alkyl group or an arylalkyl or cycloalkyl group;

$R^{10}$  is an alkyl group of 1 to 20 carbon atoms, an alkenyl group of 2 to 20 carbon atoms, or an aryl, aralkyl, heterocyclic or cycloalkyl group of 5 to 14 carbon atoms, and  $R^{11}$  represents an electron withdrawing group, or  $R^{10}$  and  $R^{11}$  may together represent the non-metallic atoms necessary to complete a substituted

or unsubstituted ring containing at least one 5- or 6-membered heterocyclic or unsaturated alicyclic nucleus;

$R^{12}$ ,  $R^{15}$ ,  $R^{16}$  and  $R^{17}$  each individually represents a hydrogen, or a carboxy, carboxyalkyl, sulfonamido, sulfamoyl, alkyl, arylalkyl, cycloalkyl, alkoxy, alkylamino, or alkylthio;

$R^{13}$  and  $R^{14}$  independently are an alkyl, alkenyl, aryl, arylalkyl, heterocyclic or cycloalkyl group, or  $R^{13}$  and  $R^{14}$  together represent the non-metallic atoms required to form a substituted or unsubstituted 5- or 6-membered ring with each other, or  $R^{13}$  and  $R^{14}$  individually represents the non-metallic atoms necessary to form a substituted or unsubstituted 5- or 6-membered fused ring with the phenyl ring to which the nitrogen is attached;

$R^{18}$  is an alkyl, arylalkyl or cycloalkyl group;

$Z^1$ ,  $Z^2$  and  $Z^3$  each individually represents the non-metallic atoms necessary to complete a substituted or unsubstituted ring system containing at least one 5- or 6-membered heterocyclic nucleus;

G is -O or -C(CN)<sub>2</sub>;

$L^4$ ,  $L^5$ , and  $L^6$  represent methine groups, wherein the methine groups may combine to form a 5- or 6-membered ring when m is equal to or >1;

$M^+$  is a cation;

p is 0, 1, 2, 3, or 4;

q is 0, 1, 2, 3, 4, or 5;

r is 0, 1, 2, 3 or 4;

s is 0, 1, 2, or 3; and

t is 0 or 1.

12. The dye of claim 8 wherein the dye is represented by Formula III.

13. The dye of claim 8 wherein the dye is represented by Formula IIIA.

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